

**THE NATIONAL ACADEMIES  
BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE**

**New Activity Announcement:**

**Surface Temperature Reconstructions for the Past 1,000-2,000 Years:  
Synthesis of Current Understanding and Challenges for the Future**

A key issue in climate change science is how climate is changing over time, and in particular how unusual the temperature changes observed over the past century are in relation to climate variability over the past 1,000-2,000 years. Instrumental records provide clear evidence that the global mean surface temperature of the Earth has risen by about 0.6 degrees Celsius since 1900. Determinations of climate changes that occurred before instrumentation became widely available in the late 19th century are based on “proxy” indicators of climatic conditions (e.g., ice cores, tree rings, corals, lake sediments, and historical accounts). Most published surface temperature reconstructions based on proxy data indicate that the Northern Hemisphere has been warmer during the past few decades than at any other time during the past 1,000-2,000 years.

Because the warmth of the late 20th century relative to previous centuries is often cited as evidence of a discernible influence of human activity on global climate, efforts to produce reliable surface temperature reconstructions are important and there has been controversy over the techniques used to make the projections. The National Academies is undertaking a study to help resolve this controversy. The study will describe and assess the state of scientific efforts to reconstruct surface temperature records for the Earth over approximately the past 1,000-2,000 years. It will summarize current scientific information, describe the main areas of uncertainty and how significant they are, describe the principal methodologies used, and identify any problems with these approaches. The study will be conducted by a volunteer committee of experts under funding from The National Academies. The committee is expected to deliver its report in late spring 2006.

The study committee bios:

CHAIR,

Gerald R. North is Distinguished Professor of Meteorology and Oceanography and holder of the Harold J. Haynes Endowed Chair in Geosciences at Texas A&M University. His professional interests include climate analysis, climate and hydrological modeling, satellite remote sensing and mission planning, and statistical methods in atmospheric science. North and his research group are interested in climate change and the determination of its origins. They work with simplified climate models which lend themselves to analytical study, estimation theory as applied to observing systems, and the testing of all climate models through statistical approaches. Dr. North is a fellow of the

American Association for the Advancement of Science, the American Meteorological Society, the American Geophysical Union, and Editor in Chief of Reviews of Geophysics. He is a former member of the National Research Council's Board on Atmospheric Sciences and Climate and Committee on Earth Studies. Dr. North received his Ph.D. in physics from the University of Wisconsin.

#### GEOGRAPHICAL REPRESENTATIVENESS, CLIMATE VARIABILITY AND CHANGE (and alternate chair)

John M. Wallace (NAS) is a professor of atmospheric sciences and director of the Joint Institute for the Study of the Atmosphere and Ocean (JISAO) at the University of Washington, Seattle. His research, and that of his students, has been directed at improving our understanding of global climate and its year-to-year and decade-to-decade variations, making use of observational data. They have contributed to documenting the existence of El Niño-like variability on a decade-to-decade time scale (the so called "Pacific Decadal Oscillation") and are currently investigating two analogous patterns of weather and climate variability--the Northern and Southern Hemisphere "annular modes," which have played a prominent role in the climatic trends of the past 30 years. Dr. Wallace is a member of the National Academy of Sciences, a fellow of the American Association for the Advancement of Science, the American Geophysical Union, and the American Meteorological Society. He has served on many National Research Council committees, including the Committee on the Science of Climate Change, Panel on Reconciling Temperature Observations, and the Climate Research Committee, and he is a current member of the Committee on Strategic Guidance for NSF's Support of the Atmospheric Sciences. He received his Ph.D. from the Massachusetts Institute of Technology.

#### CLIMATE VARIABILITY AND CHANGE

John R. Christy is a professor of atmospheric science and director of the Earth System Science Center at the University of Alabama in Huntsville where he began studying global climate issues in 1987. In 2000 he was appointed State Climatologist of Alabama. In 1989 Dr. Roy Spencer (then a NASA/Marshall scientist) and Christy developed a global temperature data set from microwave data observed from satellites beginning in 1979, for which they were awarded NASA's Medal for Exceptional Scientific Achievement. They also received a special award from the American Meteorological Society "for developing a global, precise record of earth's temperature from operational polar-orbiting satellites, fundamentally advancing our ability to monitor climate." Dr. Christy has served as a contributor and lead author for the U.N. reports by the Intergovernmental Panel on Climate Change in which the satellite temperatures were included as a high-quality data set for studying global climate change. He is a former member of several National Research Council committees, including the Panel on Reconciling Temperature Observations and the Committee on Utilization of Environmental Satellite Data. Dr. Christy received his Ph.D. in atmospheric sciences from the University of Illinois.

#### GEOCHEMISTRY, ISOTOPES

Karl K. Turekian (NAS) is the Sterling Professor of Geology and Geophysics at Yale University. His research areas include atmospheric geochemistry of cosmogenic, radon daughter and man-made radionuclides, surficial and groundwater geochemistry of radionuclides marine geochemistry and the study of climate change over geologic time. Dr. Turekian is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences. He has served on many National Research Council committees, including the Committee on the Atmospheric Dispersion of Hazardous Material Releases, Committee on Metrics for Global Change Research, Water Science and Technology Board, and Ocean Studies Board. Dr. Turekian received his Ph.D. in geochemistry from Columbia University.

#### CLIMATE MODELING, VARIABILITY, AND CHANGE

Robert E. Dickinson (NAS/NAE) is a professor in the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology. His areas of interest include the dynamics of atmospheric planetary waves, stratospheric dynamics, models of global structure and dynamics of terrestrial and planetary thermosphere, NLTE infrared radiative transfer in planetary mesospheres, global climate modeling and processes, the role of land processes in climate systems, the modeling role of vegetation in regional evapotranspiration, and the role of tropical forests in climate systems. Dr. Dickinson is a member of the National Academy of Sciences and the National Academy of Engineering and a fellow of the American Association for the Advancement of Science and the American Geophysical Union (AGU). He has served on many National Research Council committees, including the Committee on the Science of Climate Change and Climate Research Committee. He is the recipient of the American Meteorological Society's Rossby Award and AGU's Revell Medal. Dr. Dickinson received his Ph.D. in meteorology from the Massachusetts Institute of Technology.

#### PALEOCLIMATE MODELING, IPCC

Bette Otto-Bliesner is a scientist in the Climate and Global Dynamics Division at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. She is head of the Paleoclimate Group and deputy head of the Climate Change Research Section. Her research interest is to use climate system models to investigate past climate and climate variability across a wide range of time scales. She is particularly interested in the range and modes of climate variability forced naturally (internally generated, volcanic episodes, solar changes) over the last 1,000 years and extending through the Holocene to the Last Glacial Maximum (21,000 years before present). Dr. Otto-Bliesner is a member of the American Geophysical Union Paleoclimatology and Paleoclimatology Committee, the Paleoenvironmental Arctic Sciences (PARCS) Steering Committee, and the Paleoclimate Modeling Intercomparison Project (PMIP). She is also currently serving as a lead author on the IPCC Fourth Assessment report. She received her Ph.D. in meteorology from the University of Wisconsin, Madison.

#### HISTORICAL CLIMATOLOGY, LAKE SEDIMENTS

Neil Roberts is the head of the School of Geography at the University of Plymouth. His main research interests are in Holocene environmental change, especially the lake sediment record of climate and human impact in low latitude regions such as East Africa

and the Mediterranean. Dr. Roberts is a fellow of the Royal Geographical Society and a member of the British Geomorphological Research Group, the British Ecological Society, and the American Quaternary Association. He is the author of *The Holocene: An Environmental History*. Dr. Roberts received his Ph.D. from University College London.

#### ICE CORES, BOREHOLES

Kurt M. Cuffey is a professor of geography at the University of California, Berkeley. Dr. Cuffey explores the interface between climatology and geomorphology and has a particular interest in the earth's great ice sheets. His research efforts emphasize environmental change of polar regions, with a focus on glaciologic problems. He uses geophysical techniques to reconstruct histories of temperature and snowfall rate over the ice sheets. He is also working on better understanding of the physical and chemical processes that determine ice composition as a function of climate. Dr. Cuffey pioneered the use of borehole thermometry to obtain a temperature calibration of the oxygen isotope record in ice cores from Summit Greenland. He received the American Geophysical Union's Macelwane Medal in 2003. Dr. Cuffey received his Ph.D. from the University of Washington.

#### STATISTICIAN

Douglas Nychka is a senior scientist at the National Center for Atmospheric Research (NCAR). Before joining NCAR, he spent 14 years as a faculty member in the Statistics Department at North Carolina State University. In his current role, his primary challenge is interdisciplinary research and migrating statistical techniques to important scientific problems and using these problems to motivate novel statistical research. His personal research interests include nonparametric regression, statistical computing, spatial statistics, and spatial designs. Dr. Nychka currently serves on the National Research Council's Committee on Applied and Theoretical Statistics. He received his Ph.D. from the University of Wisconsin.

#### CORALS/SEDIMENTS

Ellen R. M. Druffel is a professor of biogeochemistry and oceanography at the University of California, Irvine. Her research interests include coupling between climate and ocean ventilation and their effects on global CO<sub>2</sub> cycling and tracking the influence of climate change on present and past upper ocean circulation using isotope studies of annually-banded corals. Dr. Druffel is a fellow of the American Association for the Advancement of Science and the American Geophysical Union. She has served on several National Research Council committees, including the Ocean Studies Board and the Committee on Oceanic Carbon. She received her Ph.D. in chemistry from the University of California, San Diego.

#### TREE RINGS

Franco Biondi is an associate professor and director of Graduate Studies in Geography at the University of Nevada, Reno. He is also a member of the faculty of the Graduate Program of Hydrologic Sciences and the Ph.D. Program in Ecology, Evolution, and Conservation Biology. His interests are in climate and forest dynamics, Holocene processes, and environmental change. His long-term scientific goal is to understand

climate processes affecting forest growth at multi-annual timescales in current, past, and future environments and pursues this goal using natural archives such as tree rings. His scientific background and interests are at the intersection between geography, ecology, and geology. Dr. Biondi received his Ph.D. from the University of Arizona, Tucson.